

HEAD AND NECK ANATOMY

Basic knowledge of the skull, facial bones, jaws, and muscles of the head and neck region are fundamental for a Dental Technician. It is important to understand the relationship of the bones and muscles as they work together to provide support for the dentition (teeth) and movement for mastication (chewing).

STRUCTURE OF BONE

The bones of the human skeleton provide rigid support for muscles and skin, and serve to protect the easily injured organ systems of the body. Bone itself is a living, highly vascular tissue, which is made up of both inorganic (minerals) and organic (cells & connective tissue fiber) elements. The inorganic component of bone serves as a warehouse for calcium and phosphorous, two essential minerals for the body.

Bone consists of a hard outer shell called cortical or compact bone and an inner spongy, porous portion referred to as cancellous bone (fig. 3-1). Within this cancellous area are the bone marrow spaces responsible for manufacturing blood cells. The majority of blood cells are made by the bone marrow found in the long bones, such as the femur or thigh bone.

A thin layer of connective tissue, called periosteum, surrounds each bone and provides nourishment through many vascular vessels. The periosteum also contains many nerve endings that respond to trauma with the sensation of pain. When a bone breaks, it is the periosteum that hurts, not the bone itself. When new bone is required, such as when a break occurs, it is the periosteum which provides the cells that make the new bone.

Bone can be classified as to how it develops, its location, and its shape. Membranous bone forms from the periosteum in successive layers and is usually flat such as those of the skull. The long bones of the arms and legs are cartilaginous bones, which develop from cartilage.

BONES OF THE SKULL

The skull consists of 28 bones that form the framework of the head and provide protection for the

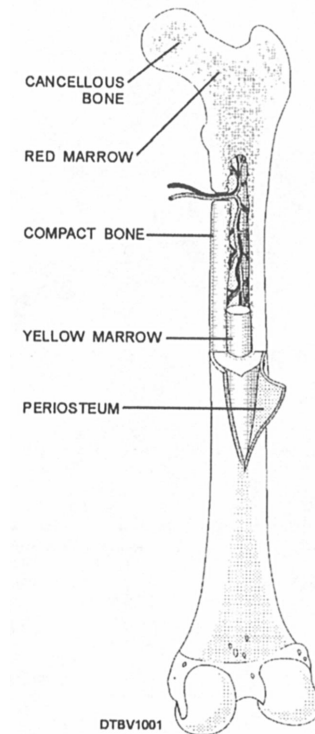


Figure 3-1.—Structure of a typical flat bone.

brain, eyes, and ears. It can be divided into two parts: the cranium and the bones of the face. The cranium is primarily involved in housing and protecting the brain. The bones of the face are a complex framework that helps to form facial features, the upper jaw (maxilla) and lower jaw (mandible). With the exception of the mandible and the bones of the inner ear, all skull bones are joined together firmly along seams called sutures. An example of sutures is shown in figure 3-2. Sutures are sometimes considered immovable; however, they do permit a small amount of movement and provide mechanical protection for the brain by absorbing much of the force if a blow to the head occurs.

The cranium is formed by eight cranial bones, which form the foundation for attachment of many of the muscles necessary for head movements and chewing. Figure 3-3 show the cranial bones, and Table 3-1 lists them as either single or paired bones.

Frontal Bone

The frontal bone forms the front part of the skull above the eyes, which includes the forehead and part of

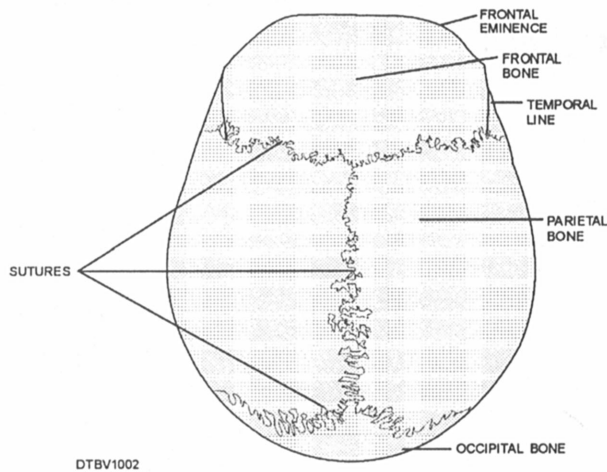


Figure 3-2.—Sutures of a skull.

Table 3-1.—Bones of the Cranium

Single Bones	Paired Bones
Occipital	Parietal
Frontal	Temporal
Sphenoid	
Ethmoid	

the nasal cavity. In children, the frontal bone develops as two parts. They are usually fused together by age 5 or 6. The two frontal sinuses (air spaces in the bone) are located above each eye socket.

Parietal Bones

The two parietal bones are located behind the frontal bone. These bones form the greater part of the right and left sides and the roof of the skull. They each have four borders and are shaped like a curved plate.

Temporal Bones

The temporal bones form the sides and part of the base of the skull in the area of the ear. One temporal bone is located on each side of the head. It is readily recognized as “fan-shaped.” Each encloses the internal ear structures and have depressions called glenoid fossae that forms the articulation with the mandible.

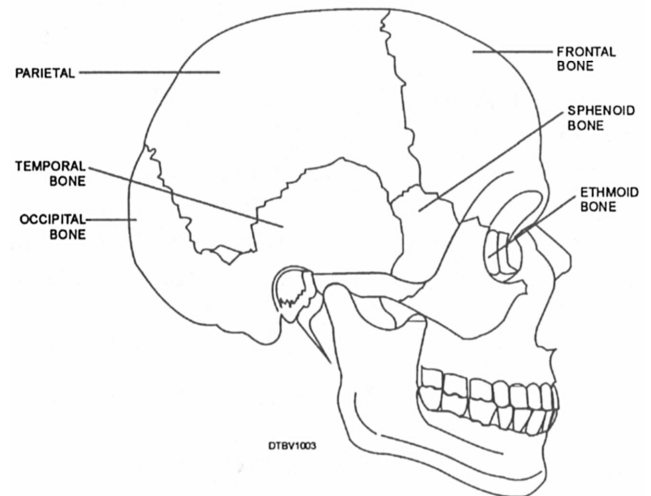


Figure 3-3.—Cranial bones.

The zygomatic process of the temporal bone projects out into the zygomatic bone of the face and forms the lateral part of the zygomatic arch. Both the glenoid fossae and zygomatic process can be seen in figure 3-4.

Occipital Bone

The occipital bone forms the back part of the skull and the base of the cranium. It joins with the parietal and temporal bones. In the center, underside (inferior) portion of the cranium, there is a large opening called the foramen magnum (fig. 3-5), through which nerve fibers from the brain pass and enter into the spinal cord.

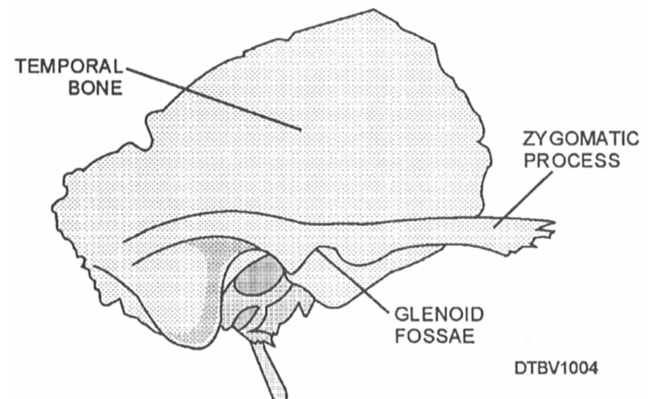


Figure 3-4.—Temporal bone.

Ethmoid Bone

The ethmoid bone is situated in front of the sphenoid bone in the front part of the cranium (fig. 3-7). Through small openings in this bone pass nerves to the roof of the mouth that are responsible for sense of smell.

BONES OF THE FACE

The facial skeleton consists of 14 stationary bones and a mobile lower jawbone (mandible). These 14 bones (table 3-2) form the basic shape of the face, and are responsible for providing attachments for muscles that make the jaw move and control facial expressions. Figures 3-8 and 3-9 show the bones of the face.

Maxillae Bones

The maxillae bones are the largest bones of the face and together form the upper jaw. The maxilla (singular) consists of a body and four processes: zygomatic, frontal, alveolar and palatine. The maxilla forms the hard palate, floor of the nose, part of the orbits (eye sockets), and the tooth sockets of the upper teeth. Above the roots of the upper teeth and below the

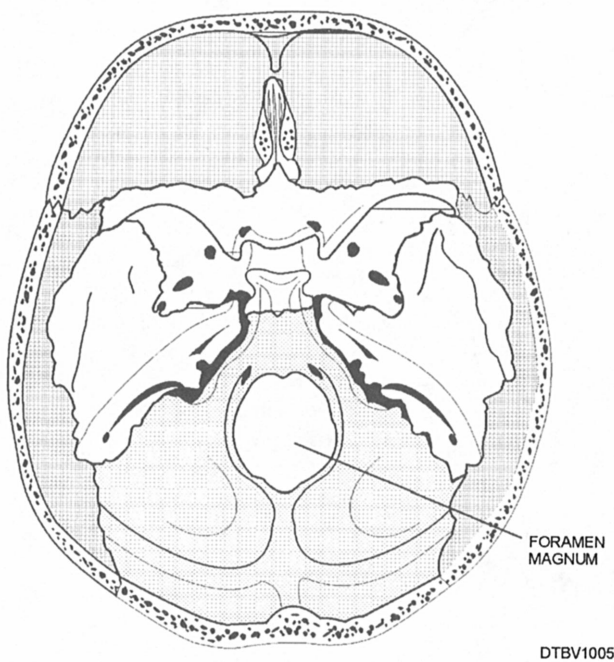


Figure 3-5.—Foramen magnum of cranial cavity viewed from above.

The occipital bone is an irregular, four-sided bone that is somewhat curved upon itself.

Sphenoid Bone

The sphenoid bone has a wing-like shape and is internally wedged between several other bones in the front part of the cranium (fig. 3-6). This bone assists with the formation of the base of the cranium, the sides of the skull, and the floors and sides of the orbits.

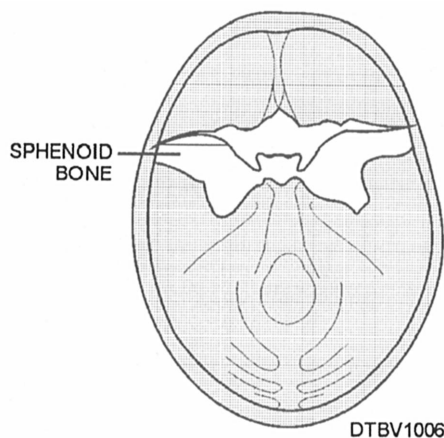


Figure 3-6.—Sphenoid bone viewed from above.

Table 3-2.—Bones of the Face

Single bones	Paired bones
Vomer	Maxillary
Mandible	Palatine
	Zygomatic
	Lacrimal
	Nasal
	Inferior nasal conchae

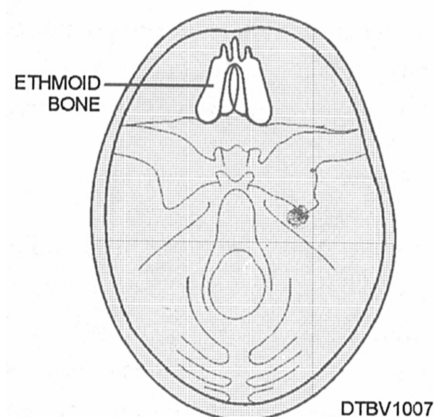
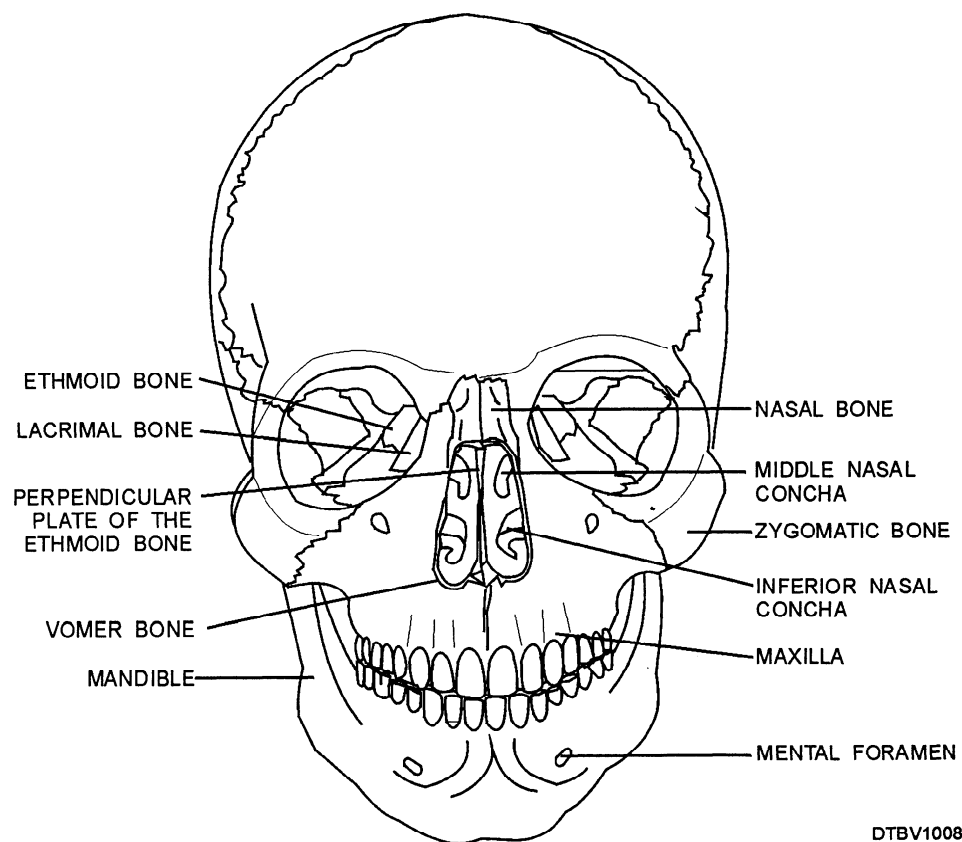
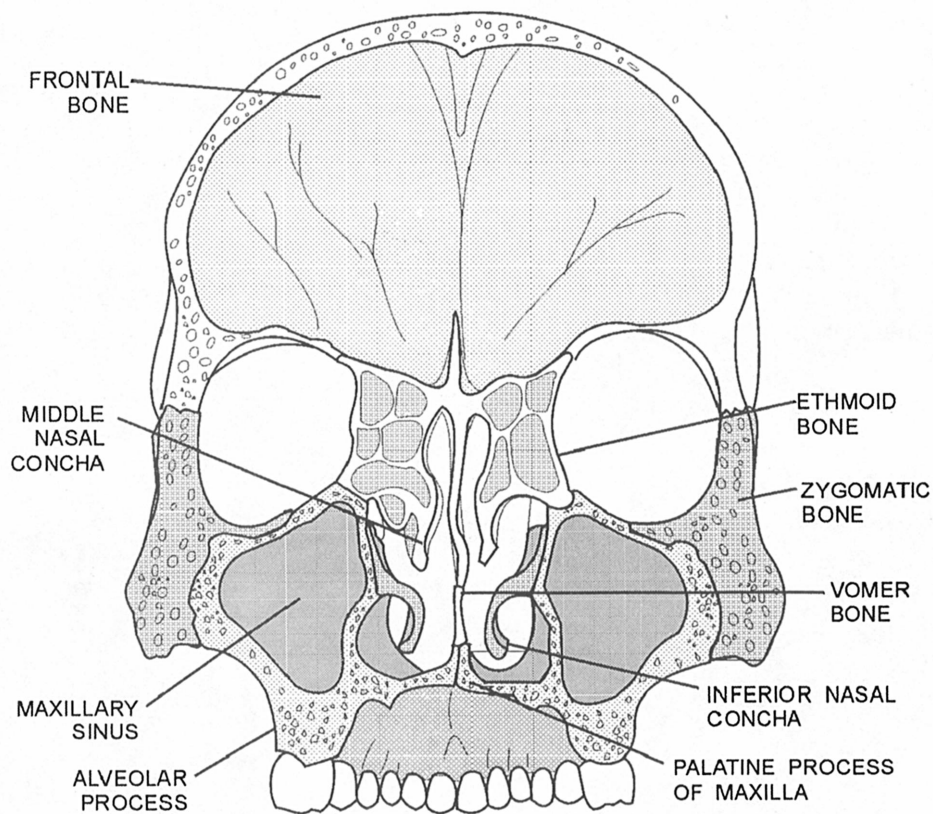


Figure 3-7.—Ethmoid bone viewed from above.



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Figure 3-8.—Anterior view of facial skeleton.



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Figure 3-9.—Posterior view of facial skeleton.

floor of the orbits are the maxillary sinuses; the largest of the sinuses.

Palatine Bones

The palatine bones are located behind the maxillae (fig. 3-10). The bones are somewhat L-shaped and form the posterior portion of the hard palate and the floor of the nose. Anteriorly, they join with the maxillary bone.

Zygomatic Bones (Zygoma, Malar Bone)

The zygomatic bones make up the prominence of the cheeks and extend from the zygomatic process of the temporal bone to the zygomatic process of the maxilla. The zygomatic bones form the “cheek bones” and help to form the sides and floor of the orbits.

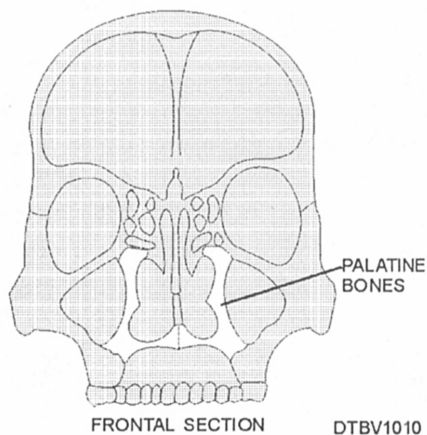


Figure 3-10.—Anterior view of palatine bones.

Lacrimal Bones

The lacrimal bones are the smallest and most fragile of the cranial bones. These thin, scalelike structures are located in back of the frontal process of the maxilla.

Nasal Bones

The nasal bones are small oblong bones somewhat rectangular in shape. They lie side by side and are fused at the midline to form the bridge of the nose (nasal septum). These bones are responsible for the shape of the nose.

Inferior Nasal Conchae

The inferior nasal conchae are curved, fragile, scroll-shaped bones that lie in the lateral walls of the nasal cavity. They provide support for mucous membranes within the nasal cavity.

Vomer Bone

The vomer bone is a thin, flat, single bone almost trapezoid in shape. It connects with the ethmoid bone and together they form the nasal septum.

Mandible

The mandible (lower jaw-bone) is the longest, strongest, and the only movable bone in the skull. Figure 3-11 illustrates the anatomy of the mandible.

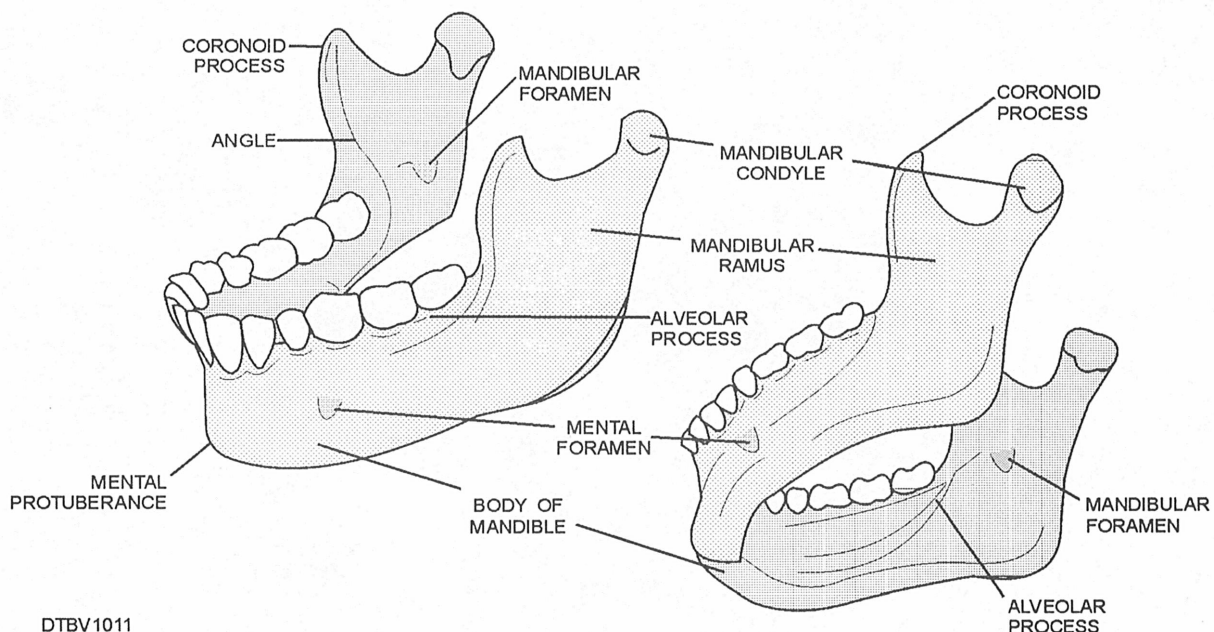


Figure 3-11.—Anatomy of the mandible; lateral view (left), inferior view (right).

The mandible is horseshoe-shaped, with an upward sloping portion at each end called the ramus. The rami are divided into two different processes:

- Condylod process—Also called mandibular condyle, located posterior on the ramus and forms the head of the mandible. It is knuckle-shaped, and articulates in the glenoid fossa of the temporal bone to form the temporal mandibular joint.
- Coronoid process—Located anterior of the condyle, and provides attachment for the temporal's muscle, which helps lift the mandible to close the mouth.

Other important anatomical landmarks of the mandible you should be able to recognize are as follows:

- Alveolar process—Supports the teeth of the mandibular arch.
- Mental protuberance—Also referred to as the chin and is located at the midline of the mandible.
- Mental foramen—Located on the facial surfaces of the mandible on both the right and left sides, just below the second premolars. This opening contains the mental nerve and blood vessels.
- Body—The heavy, horizontal portion of the mandible below the mental foramen extending from the angle to the parasymphysis region.

- Angle—Juncture where the body of the mandible meets with the ramus.

- Mandibular foramen—Located near the center of each ramus on the medial side (inside), through this opening passes blood vessels and the inferior alveolar nerve, which supply the roots of the mandibular teeth. This is a common area where the dental officer will inject anesthetic to block the nerve impulses and make the teeth on that side insensitive (numb).

BONES OF THE EAR

In each middle ear and located in the auditory ossicles are three small bones named the malleus, incus, and stapes (fig. 3-12). Their function is to transmit and amplify vibrations to the ear drum and inner ear.

TEMPORAL MANDIBULAR JOINT

The right and left temporal mandibular joints (TMJs) are formed by the articulation of the temporal bone and the mandible. This is where TMJs connect with the rest of the skull. Figure 3-13 illustrates the TMJ.

The mandible is joined to the cranium by ligaments of the temporal mandibular joint (fig. 3-14).

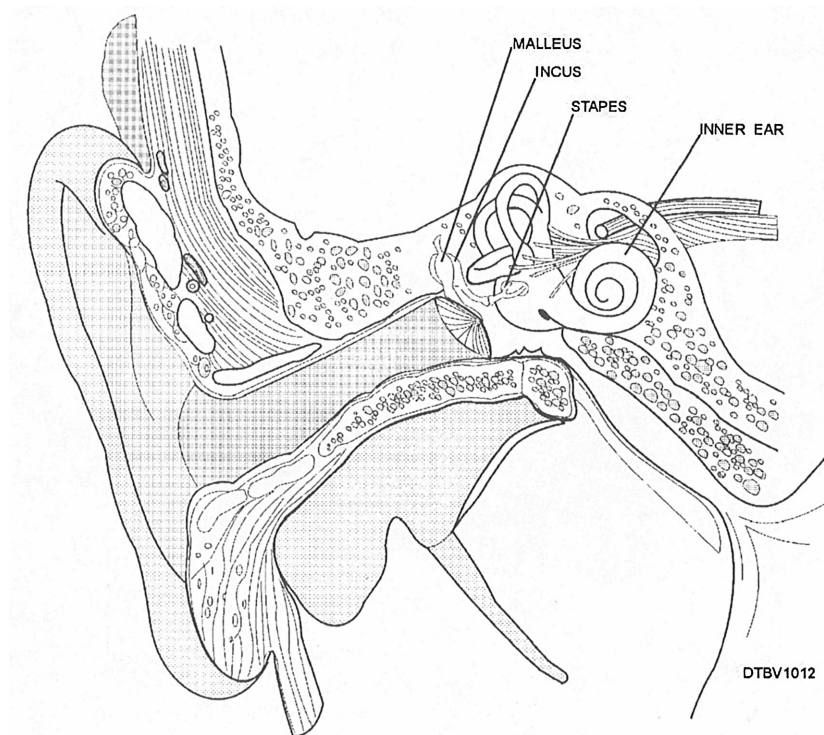


Figure 3-12.—Anatomy of the middle ear.

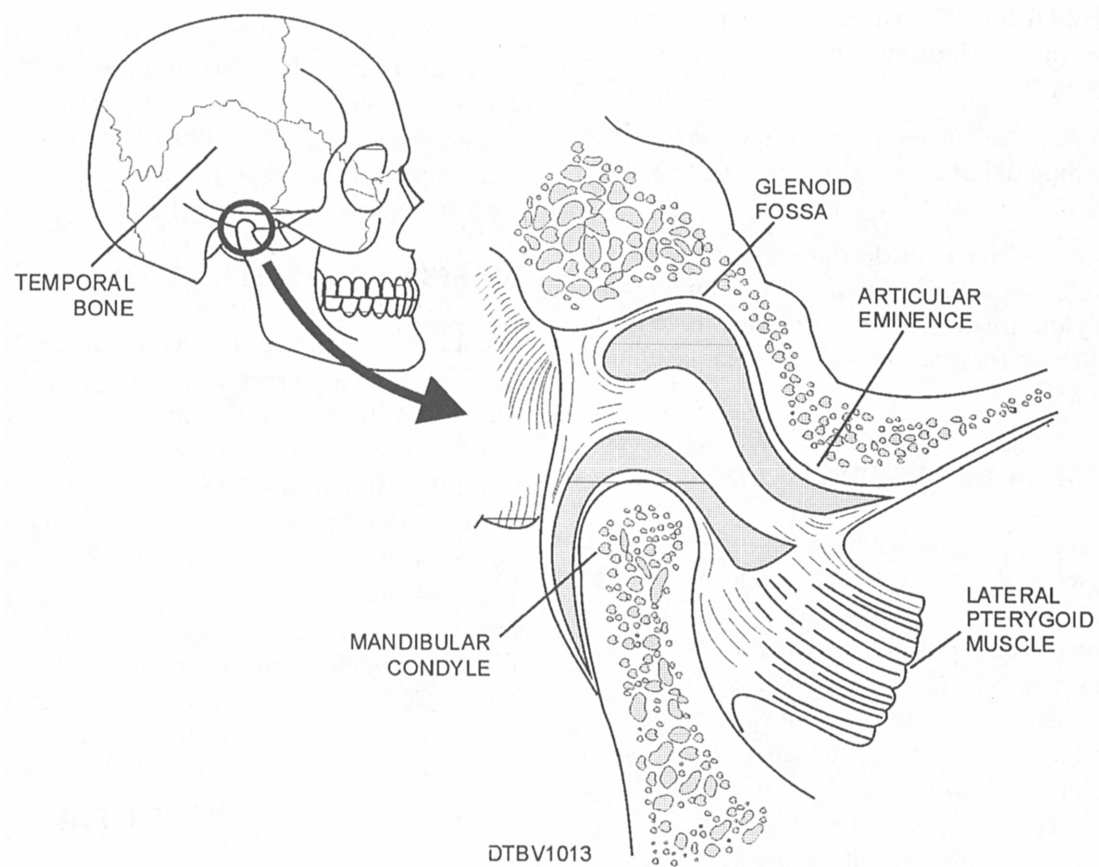


Figure 3-13.—Temporal mandibular joint.

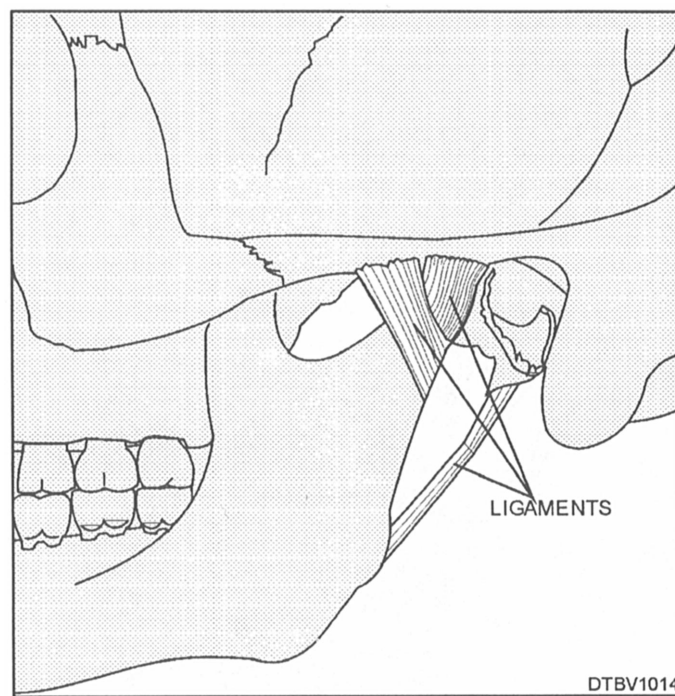


Figure 3-14.—Ligaments of a temporal mandibular joint.